

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Engine Safety, Control and Alarm System

with type designation(s)
LESS system type KN353A4

Issued to
NORIS Automation GmbH
Nürnberg, Bayern, Germany

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Temperature	B*
Humidity	B*
Vibration	B*
EMC	A*
Enclosure	Required protection according to Rules shall be provided upon installation on board

*** see Product description on page 2**

This Certificate is valid until **2023-05-24**.

Issued at **Hamburg** on **2018-05-25**

DNV GL local station: **Augsburg**

for **DNV GL**

Approval Engineer: **Heinz Scheffler**

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Joannis Papanuskas
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Certificate No: **TAA00001US**
File No: **852.60**
Job Id: **262.1-011674-4**

Product description

LESS system performs start/stop control of engines as well as monitoring and safety functions according to the DNVGL Rules.

LESS system comprising following hardware components:

System	Device type	Firmware version	Configured device	* DNVGL TA Certificate
N3000 Alarm & Control System	N3000-IMC (I/O Box)	N3_ALA_1.14xx N3_ALA_1.24xx	A01.1; A03.1; A04.1	TAA00000DR
N3000 Alarm & Control System	N3000-ISC (I/O Box)	N3_Slv_1.14xx	A01.2; A03.2; A03.3	TAA00000DR
N3000 Alarm & Control System	N3000-DSP (Display)	N3_DSP_107xx	A01.3	TAA00000DR
N3000 Safety System	N3000-SAP-53A4	N3-SAP_1.xxy N3-SAPf_1.xxy	A05	TAA00001NJ

LESS system is exclusively type approved for below listed applications for CatMAK engines of type M20, M25, M32, M43, VM32, VM43 only:

- LESS GENO: Genset applications
GENO Standard (Conventional diesel engines)
- LESS CPP: Propulsion applications
CPP Standard (Conventional diesel engines)

SW version for LESS system (depending on plant configuration)

Plant configuration	Software version
GENO Standard (Conventional diesel engines)	2.01.cc
CPP Standard (Conventional diesel engines)	1.01.cc

General explanation of software revision number content: **a.bb.cc**

a = Engine Type (acc. to document NMS-PD-0036-6-en item 2)

bb = PLC Software Version (If changed DNVGL has to be informed)

cc = Revision History (acc. to document NMS-PD-0036-9-en (changes not relevant for DNVGL - bug elimination, etc.))

The current software numbers and versions are listed in documents:

- Info 610E, "SYSTEM N3000 N3000-SAP-xxx Software Release"
- Info 622E, "SYSTEM N3000 N3_DSP ... Software Release Index"
- Info 623E, "N3_Slv... and N3_SxP... Software Release Index"
- Info 624E, "SYSTEM N3000 N3_ALA ... Software Release Index"
- NMS-PD-0036-6-en "KN353A4... Type Code and PLC Software Version"

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Application/Limitation

- It must be ensured that the remote reset and oil mist override functions are disabled for deliveries to vessels in DNVGL class.
- LESS system is not fit for use in emergency generator prime mover applications.
- CHANGE GENSET function is used on below applications as follows:
- GENO: when function is ON, external PMS system receives a signal to start standby generator
- CPP: when the function is ON, request for load reduction is sent to external CPP control system
- Electronic governor is not covered by this approval. See approval conditions.
- Sensors and actuators are not covered by this approval and must be presented to surveyor upon request to be verified against requirements in Pt.4 Ch.9 Sec.5.2.
- System does not provide alarm presentation and handling functions, only alarm signals to connection interface. System has to be connected to external alarm handling and interface system.

Approval conditions

The Type Approval covers system design principles and software listed under Product description.

The following documentation of the actual application is to be submitted for approval in each case:

- Reference to this Type Approval Certificate
- System block diagram (showing both LESS components and governor and other units, if any)
- Power supply arrangement (may be part of the System block diagram)
- Reference to applicable engine type
- Alarm and shutdown list
- Test program for certification at manufacturer

Product certificate

As long as the units are covered by the Type Approval, a product certificate according to Pt.4 Ch.9 Sec.1 will not be required. Correct configuration and set up for each delivery to be tested during commissioning after installation.

Deliveries of the application system to new engine types (not listed under Product description) are to be certified according to Pt.4 Ch.9 Sec.1. The certification test is to be performed at the manufacturer of the application system before the system is shipped to the yard. After the certification the clause for application software control will be put into force.

Clause for application software control

All changes in software are to be recorded as long as the system is in use on board. The records of all changes are to be forwarded to DNVGL for evaluation and approval.

Major changes in the software are to be approved before being installed in the computer.

A Certification of Application Functions may be required for the particular vessel.

Type Approval documentation

Acceptance Program for Engine Test Run.pdf

PA14.115-en_V01.00_FAT LESS CPP Standard.pdf; PA14.117-en_V01.00_FAT LESS GENO Standard.pdf

SP 1.93.7-46.92.00-68_en.pdf; SP 1.98.7-46.92.00-15_en.pdf; SP 1.99.7-46.92.00-42_en.pdf;

SP 1.99.7-46.92.00-70_en.pdf; SP 2509.7-46.92.00-61_en.pdf

NMS-PD-0036-1-en_V01.16_KN353A4C-FE_CPP_User Manual

NMS-PD-0036-2-en_V01.15_KN353A4D-FE_GENO_User Manual

NMS-PD-0036-3-en_V01.03_KN353A4...-FE_Trouble Shooting Guide

NMS-PD-0036-4-en_V01.01_FMEA for LESS

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NMS-PD-0036-5-en_V01.00_Product and Process FMEA for LESS
NMS-PD-0036-6-en_V01_09_KN353A4_Type Code and PLC Software Version
NMS-PD-0036-7-en_V01.01_KN353A4..._List of Devices and Accessories
NMS-PD-0036-8-en_V01.01_LESS Varianten_Overview
NMS-PD-0036-10-en_V01.00_KN353A4..._MODBUS Description
NMS-PD-0036-11-en_V01.01_KN353A..._Load Exhaust Gas Group via CF card
NMS-PD-0036-15-en_V01.00 PCN overview Troubleshooting Guide – Part 2
Process of proof testing operation / supervision Large Engine Safety System, dated 2012-11-02
I610E_V143_N3000-SAP_SoftwareRevision
I622E_V102_N3_DSP Software Release Index
I623E_V01.10_N3_Slv and SxP Software Release Index
I624E_V123_N3_ALA Software Release Index

Tests carried out

Applicable tests according to Standard for Certification No. 2.4, April 2006.
Function testing at NORIS, Nürnberg, dated 2011-12-12
Function testing at Caterpillar, Kiel, dated 2011-11-18
Function testing for Common Rail applications at Caterpillar, Kiel, dated 2012-11-02

Marking of product

The products to be marked with:

- Manufacturer: Caterpillar Motoren GmbH & Co. KG
- Model name: LESS cabinet / As listed under Product description
- Serial number: Unique for each delivered item

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE